DOCUMENTATION
FOR

Oak Ridge Site Visit –June 19, 2001
for
Program Research and Development Announcement (PRDA) No. DE-RA26-01NT41178
"Advancements for Delivering *In Situ* Treatment for Soil and Groundwater Contamination in Difficult Conditions at DOE Sites"

CONTENTS

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Agenda

Oak Ridge Site Visit –June 19, 2001

Oak Ridge, Tennessee

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Program Research and Development Announcement (PRDA) No. DE-RA26-01NT41178
"Advancements for Delivering *In Situ* Treatment for Soil and Groundwater Contamination in Difficult Conditions at DOE Sites"

1:00	General Welcome/Introduction	DOE/Oak Ridge and DOE/NETL
	Background	DOE/Oak Ridge
	Safety Overview	Bechtel Jacobs, Inc.
	Site Tour	Bechtel Jacobs, Inc. and DOE/Oak Ridge
4:00	Wrap-up	All

Oak Ridge Site Visit Attendee List
June 19, 2001

Name	Affiliation/Address	Phone No. /E-mail address
Brent Huntsman	Terran Corporation Dayton, Ohio	(937)320-3601 behuntsman@terrancorp.com
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Shari Dunn-Norman	Department of Geological & Petroleum Engineering University of Missouri-Rolla 129 McNutt Hall Rolla, MO 65409	(573)341-6935 caolila@umr.edu
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Charlie Lutz	IT Corporation 312 Directors Drive Knoxville, TN 37923	(865)694-7434 clutz@theitgroup.com
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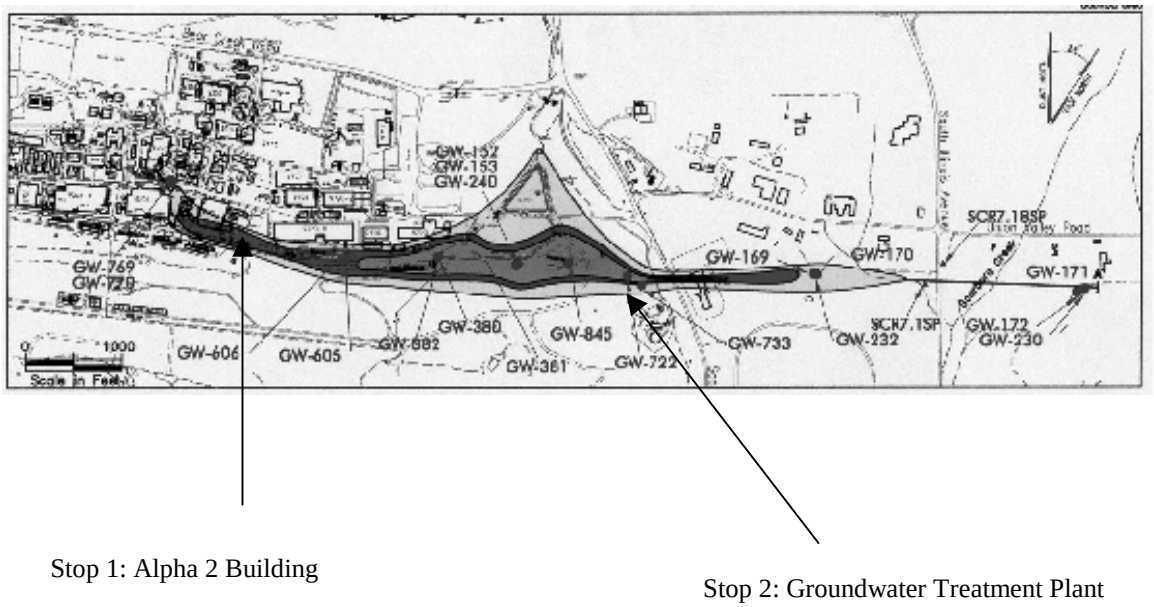
Fieldstops and Information displays

Y-12 tour field stops (see following map with stop located)

Stop 1. Building 9201-2 (Alpha –2)

Stop 2. Groundwater Treatment System (Building 9422-22)

Figure 1: Fieldstops at Y-12 Site Visit



Stop 1: Alpha 2 Building

Stop 2: Groundwater Treatment Plant

Site Visit Questions and Answers

General

Q1: What is the radius of influence/draw down on the current groundwater extraction well?
A The radius of influence is elliptical (long dimension parallel to geologic strike) and varies with pumping rate. Based on data from BJC/OR-103, at a pumping rate of 25gpm, drawdown at the pumping well (GW-845) will be on the order of 4 to 5 ft. The resultant cone of depression extends approximately 600 ft up gradient and down gradient from GW-845 in a strike-parallel direction, and approximately 200 ft north and south of GW-845 in a strike-perpendicular direction.

Q2: How deep is the current groundwater extraction well?
A: 430 ft.

Q3: Does the hydraulic conductivity decrease with depth ?
A: No trends exist with respect to depth and conductivity. If no significant fractures exist the conductivity ranges from $10^{-5} – 10^{-6}$ cm/s, if fractures exist the conductivity ranges form $10^{-2} – 10^{-3}$ cm/s.

Q4: Regarding pump test data and flow meter data; is the data consistent?
A: The flow meter data was not quantitative. The tests only look for movement of water in and out of the borehole.

Q5: Where will field tests/demonstration site be located for Topic 1?
A: See response to Q10 and refer to the solicitation, once it has been issued, regarding the location of field tests and demonstrations.

Q6: Can you characterize the Copper Ridge Dolomite?
A: The Copper Ridge Dolomite is the uppermost stratigraphic sequence within the area of interest; it is the lowermost formation of the Knox Group and it underlies Chestnut Ridge. The Maynardville Limestone is the formation of concern and it along with the overlying Knox Group exhibit widespread evidence of dissolution. This is manifested as enlarged fractures and well-developed, well-connected cavity systems, and thus forms the primary pathway for groundwater movement out of the Upper East Fork Poplar Creek Characterization Area and into West Union Valley.

Q7: Is there any strength data on the Maynardville Limestone formation? How hard is it?
A: No. We are not aware of any strength testing on this formation.

Q8: Does the plume move primarily through the Maynardville Limestone formation?
A: Yes

Q9: Are there other references that would be helpful in understanding the need/problem at the Oak Ridge site?
A: Several references were provided in the Information Package posted on the NETL business page, including the TechCon web site (web.ead.anl.gov/TechCon/Projects/dnapl/description/index.cfm), the Innovative Treatment and Remediation Demonstration (ITRD) web site (www.nwer.sandia.gov/itrd), and Upper East Fork Poplar Creek Remedial Investigation. Also, there is the www.osti.gov site that has all the published DOE reports and the Information Resource Center,105 Broadway, Oak Ridge, TN , 37830 that has all the CERCLA reports.

Q10: In the Information Package issued at the NETL business page, under Attachment 2, Description of Representative Sites, Oak Ridge Site (Topic Area 1), the document states that the offeror will be required to identify and arrange a demonstration site that is off-site to DOE Oak Ridge property. Can you comment on a possible candidate site for the field testing?
A: The NABIR Field Research Center at Y-12 is a possible candidate site. Subsurface strata include the Maynardville Limestone. We have to get permission to use that site and we do not have it yet.

Stop 1. Alpha-2 Building

Q11: Are there plans available for underground utilities?
A: Yes. Available plans may not include most recent updates, as there are revisions made periodically. These could be made available to the successful offeror. Also, Excavation/Penetration permits are required and a complete review of underground utilities in a specific location is done during permitting process.

Q12 With respect to this stop, where is the source of contamination located?
A: The source is thought to be located south and east of this point. See Figure 1 of the Information Package posted on NETL's Business page for a map of the groundwater plume.

Q13: What is the width of the groundwater plume at this stop?
A: The location and size of the groundwater plume is illustrated in Figure 1, provided as part of the Information Package posted on NETL's Business page.

Q14: What is the structural orientation of the strata at this stop?
A: The strata dip at an angle of approximately 45 degrees toward Upper East Fork of Poplar Creek (UEFPC), but plume moves in a direction parallel to the UEFPC.

Q15: Have there been any geophysical studies in this area?
A: No, although borehole geophysical logging has been conducted in several boreholes within the study area.

Q16: What is the typical depth of the shallow wells in the area?
A: The shallow wells are approximately 50-100 ft in depth.

Q17: Has any directional drilling been tested in area?
A. No.

Q18: Is it possible to shut off power of overhead utilities to conduct work in this area?
A: It would be difficult to arrange, but possible.

Q19: Would a general drilling technology that proposes improved drilling methods, but that does not really focus on the needs described in Topic 1 (or Topic 2), be considered for funding?
A: Please refer to the solicitation, when it is issued, with respect to need areas, proposal preparation instructions, and technical evaluation criteria. Needs identified for Topic 1 are for a delivery system for a variety of bioremedial fluids; if the technology is versatile enough to also deliver other treatment agents, it would be considered more advantageous. The system must be able to operate in the difficult conditions described.

Q20: Has the bioremedial fluid been selected ?
A: Yes, most likely a bio-stimulant, such as lactate or molasses will be used.

Q21: Are there any references available on the properties of bioremedial fluids (e.g. viscosity, etc)?
A: Lactate and molasses are examples of possible fluids. The published literature is likely to contain information for these and other bioremedial fluids.

Q22: Are the buildings at Y-12 still in use?
A: Some are still used for other purposes.

Q23: If the upcoming push-pull bio-stimulant test does not show promise, will the DOE go forward with the current plan to use bio-stimulants.
A: It depends on the reason the "push-pull" test is not successful. We may have to switch to bioaugmentation, but will still need a delivery system for that.

Q24: Does the bio-stimulant come ready to be injected, or does it have to be mixed?
A: We do not know which one will be used. We will have to do some more tests on the sediments when we drill the new well. The previous tests used lactate and it was acceptable.

<u>Stop 2. Groundwater Treatment System (Pump and Treat Well)</u>

Q25: Can you provide a description of this well and contamination at this site?
A: The well has an approximate total depth of 430 ft. The well is cased with 8 5/8 in. OD (~8 1/8 in. ID) steel casing a depth of 156.9 ft bgs. The well is completed as a 7 7/8-in-diameter open hole from approximately 157 to 438.3 ft bgs. Pumps are located at approximately 300-350 ft. The pumping rate is about 25 gallons per minute. The carbon tetrachloride concentration in the groundwater in this area is about 300-400 parts per billion. The treatment method is air stripping.

Q26: Where is the DOE property line relative to this stop?
A: The DOE-property line to the east is Scarboro Ave.

Q27: What portion of the plume is optimal to treat?
A: Treatment of the source area is considered to be the optimum approach.

Q28: How far is source from this stop?
A: The exact location of the source is not known, but the general source area is thought to be about 4500 ft from this area.

Q29: Have radionuclide contaminants been detected in wells?
A: Not at this extraction well, but radionuclides at low concentrations have been detected in other wells.

Q30: What is the diameter of most wells in area?
A: They are typically 4- inch diameter wells.

Q31: Would existing wells be able to be used for additional characterization data?
A: This is possible and would be worked on a case-by-case basis.

Q32: How many wells are in area?
A: See Figure 1 provided in Information Package posted on the NETL business page.

Q33: Are local private wells monitored?
A: No, but some off-site wells are maintained and monitored.

Q34: How was the extraction well installed?
A: A combination of hollow-stem auger and air rotary.

Q35: Could the successful offeror utilize existing wells to gather additional information?
A: See answer to question Q31.

Q36: Explain the relationship between NETL, Bechtel Jacobs?
A: Please refer to the solicitation, once it has been issued regarding the roles of NETL and other parties with respect to this project.

Q37: Will Bechtel Jacobs have review approval authority over documentation; i.e. HASP, AHA's, Corporate Health Program, etc.
A: Please refer to the solicitation, once it has been issued regarding the review and approval of required plans and documents.

Q38: Is there any radionuclide contamination in the plume? If so how much ?
A: Please see response to Q29.

Q39: Can some of the QA requirements be given at this time, i.e. QAPP tech procedures, documents, controls, etc ? Who will review and approve.
A: Please refer to the solicitation, once it has been issued regarding Quality Assurance requirements and procedures.

Q40: Is this procurement dependant on the results of the push-pull test to be conducted in the fall?
A: Please refer to the solicitation, once it has been issued regarding the procurement process.

Q41: When will we get a list of the attendees for the site visit.
A: A list of the site visit attendees will be posted on the NETL business page with a package of information documenting the site visit, sometime after the site visits.

Q42: Has hydraulic fracturing been applied to any of the wells drilled at the site?
A: No

Q43: What is the average thickness of the Maynardville Limestone formation.
A: Thickness of the Maynardville Limestone typically ranges from 300 to 350 ft.

Additional Questions Submitted:

Q44: Has the biostimulant reagent already been selected? Is the DOE/NETL soliciting only the delivery system?
A. See response to questions 19, 20, and 21. Topic Area 1 of the solicitation is focused on development of improved delivery systems.

Q45. How will the existing pump and treat system affect or be integrated into the injection project?
A. The development of an improved delivery system for injection of nutrients or other remediation fluids does not have to be directly integrated into the existing pump and treat system. However, it is hoped that the delivery of these fluids to a DNAPL source would greatly shorten the estimated time that a pump and treat system would have to operate. It is important to note that operation of the pump and treat system is mandated by regulatory agreements. It will remain in operation during any test and development activities associated with implementation of a bioremediation system.

Appendix A: Handouts and Presentations

Effective Delivery of Bioremediation for VOC Contamination

- NETL procurement funded by EM-50
- WP9 Access and Delivery Systems in SCFA DNAPL PL
- Y-12 Site has the need, BJC is M&I
- ITRD, Sandia, INEEL, BJC, ORNL, SCFA have an existing team working on other phases of the problem with EM-30 and EM-50 funds

Advancements for Delivering in Situ Treatment for Soil and Groundwater Contamination in Difficult Conditions at DOE Sites

OAK RIDGE Y-12 SITE VISIT

"Advancements for Delivering In Situ Treatment for Soil and Groundwater Contamination in Difficult Conditions at DOE Sites"

DE-RA26-01NT41178

June 19, 2001

AGENDA

- **12:30 - 1:00 Registration**
- **1:00 - 4:00 Welcome, Background, Instructions for Site Tour, Site Tour**
- **4:00 Wrap-up**

PURPOSE

- **Reference:**

DOE solicitation DE-RA26-01NT41178

- **Opportunity for tour at Oak Ridge's Y-12 National Defense Facility: area of carbon tetrachloride plume in difficult conditions**

- **Topic Area 1 example: Need for delivery of biotreatment**

DOE EM PROGRAM

- DOE EM Office of Science and Technology (OS&T) solicitation
- Industry Programs, SCFA, Oak Ridge
- “Advancements for Delivering In Situ Treatment for Soil and Groundwater Contamination in Difficult Conditions at DOE Sites”, DE-RA26-01NT41178
- http://e-center.doe.gov/
- http://www.netl.doe.gov/business/

WRAP-UP

- **Additional questions/comments?**

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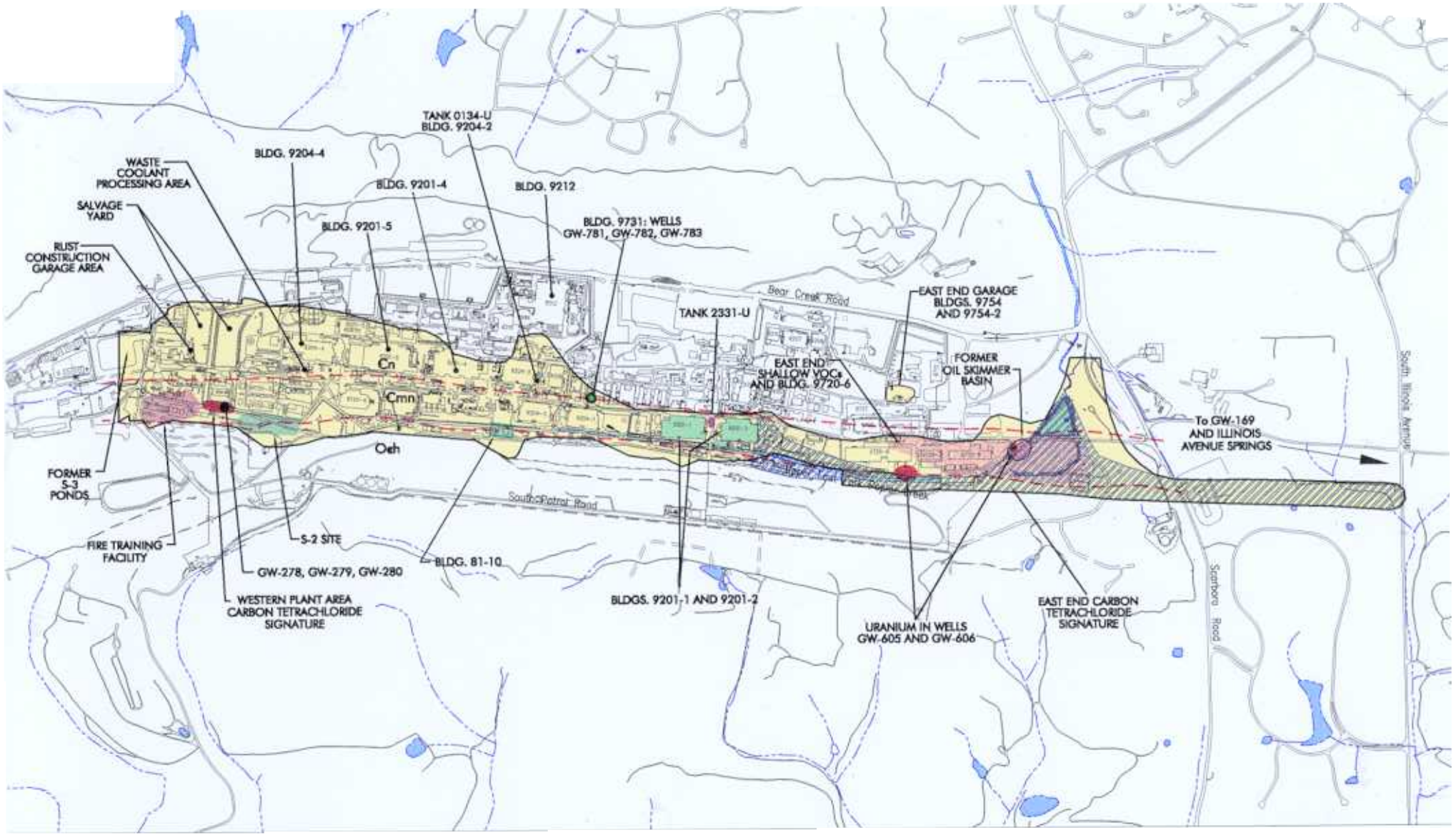
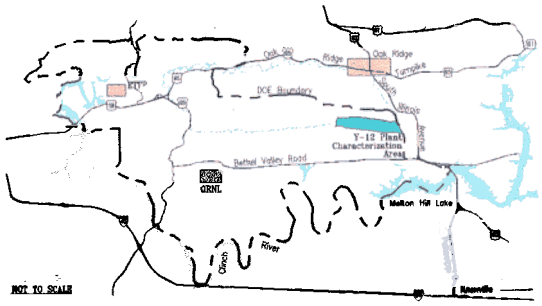


SITE KEY LOCATOR



LEGEND:

- BUILDINGS
- PRIMARY ROADS
- SECONDARY ROADS
- FENCE
- CREEK & TRIBUTARIES
- GEOLOGIC CONTACT
- CARBON TETRACHLORIDE SIGNATURE
- Y-12 PLANT GRID

- Cn — NOLICHUCKY SHALE
- Cmn — MAYNARDVILLE LIMESTONE
- Oek — COPPER RIDGE DOLOMITE (KNOX GROUP)

PLANT NORTH / TRUE NORTH

SCALE: = 1600'

Science Applications International Corporation

UEFPC CA RI REPORT
OAK RIDGE, TENNESSEE

REV. C / 02-17-98 / FILE NO.: 97009\DWGS\8390VH26

Groundwater contaminant signatures and source areas.

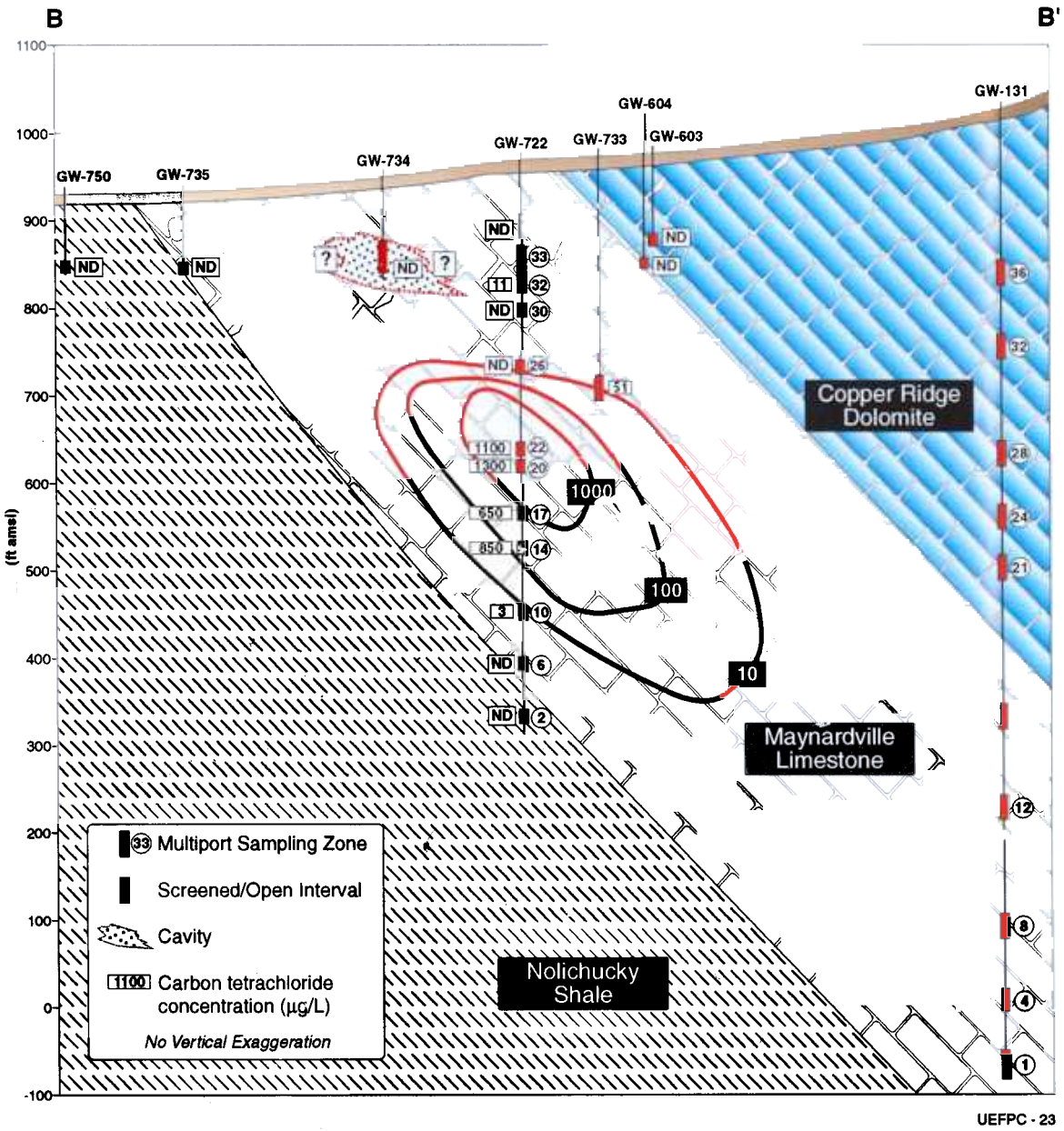
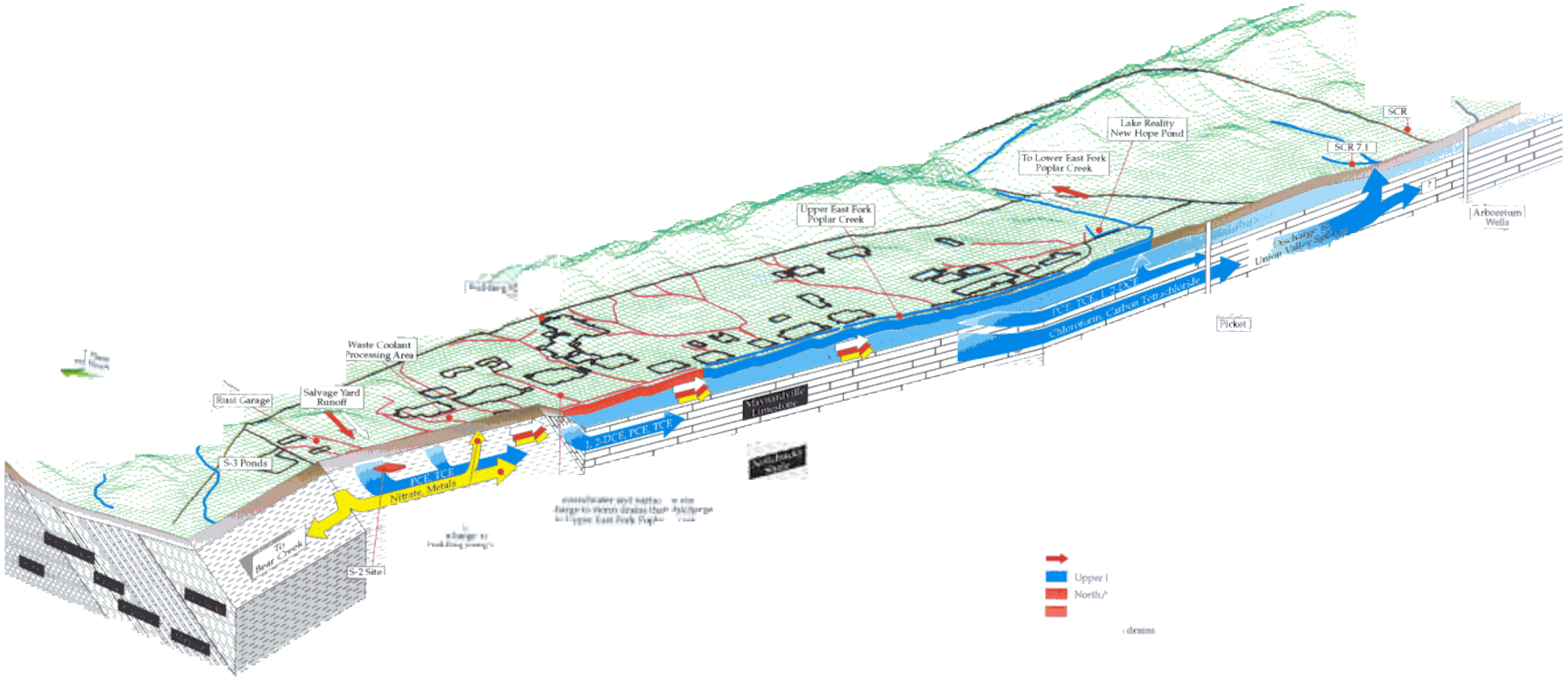
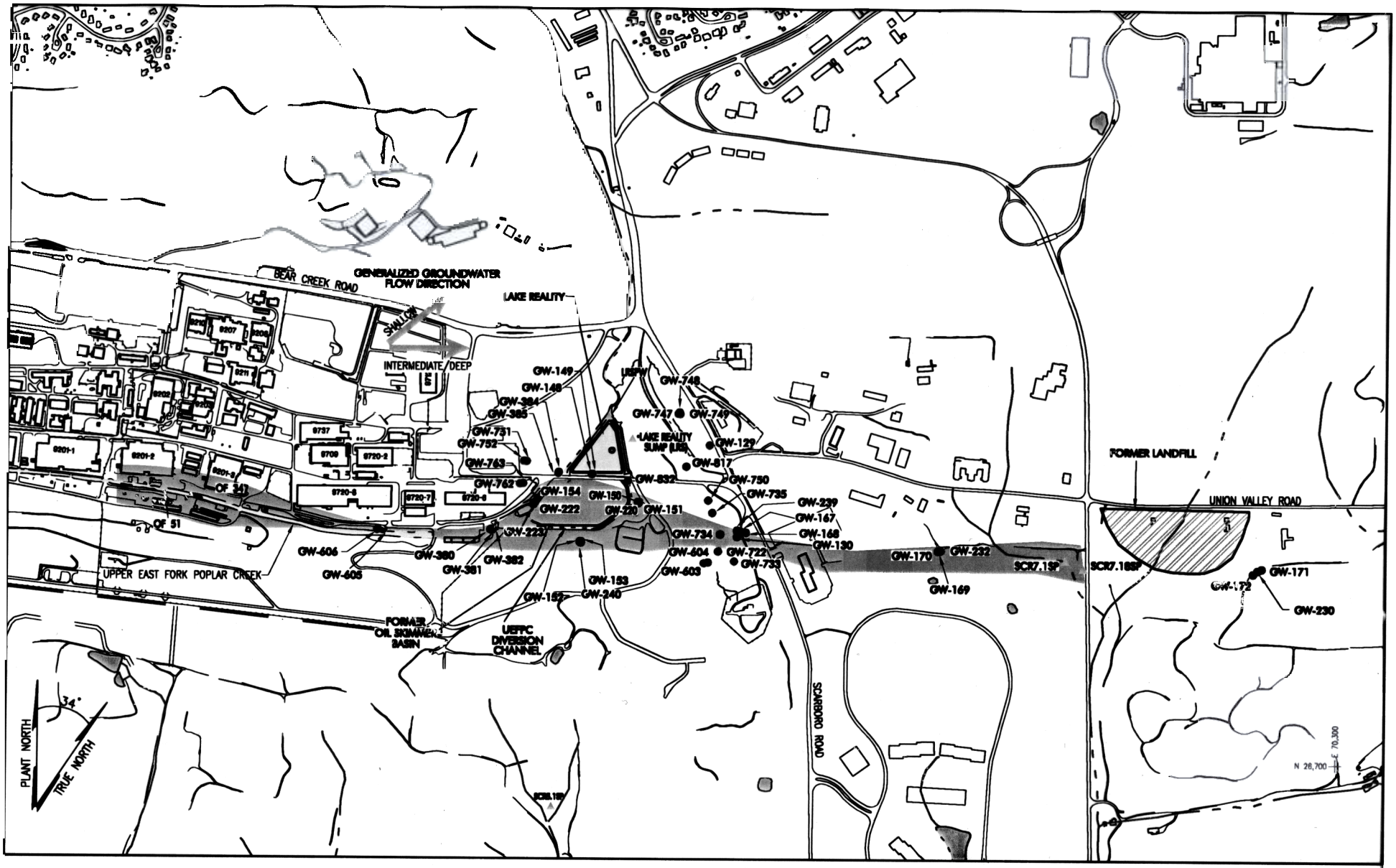


Fig. 8.7. North-south trending cross-section across the Maynardville Limestone in the vicinity of the eastern property boundary (i.e., Picket J).


Lake Reality
New Hope Pond
To Lower East Fork
Poplar Creek
SCR
SCR 7.1
Upper East Fork
Poplar Creek
Arboretum
Wells
Waste Coolant
Processing Area
Salvage Yard
Runoff
Rust Garage
S-3 Ponds
PCE, TCE
Nitrate, Metals
1,2-DCE, PCE, TCE
Maynardville
Limestone
Chloroform, Carbon Tetrachloride
Picket
Bear Creek
S-2 Site



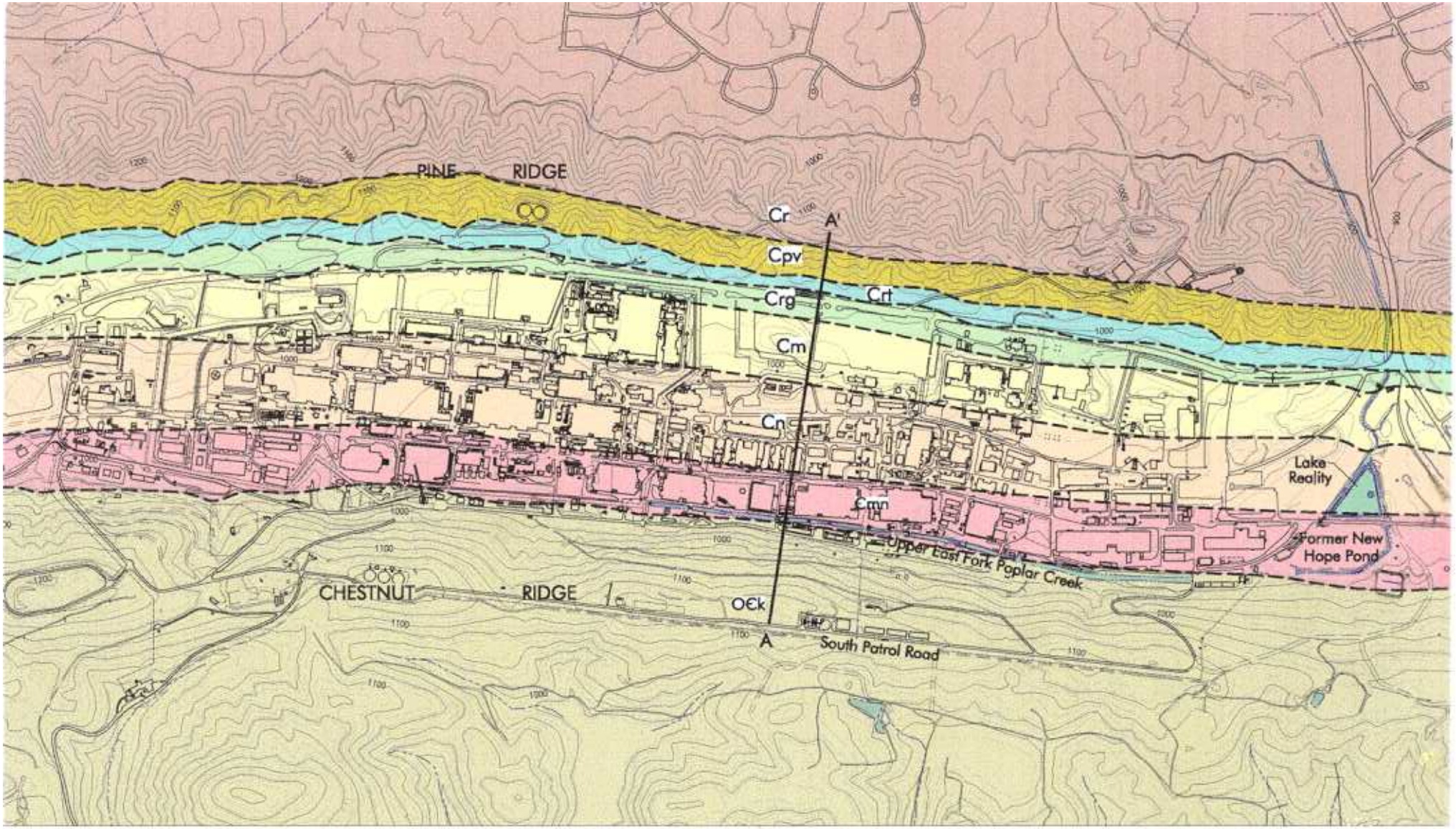
EAST END VOC PLUME AND SELECTED MONITORING LOCATIONS

LEGEND:

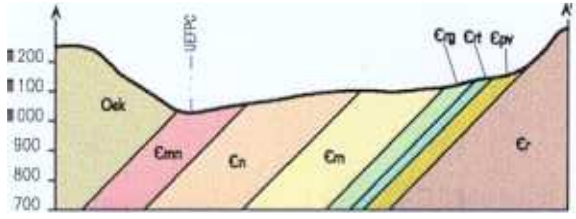
- ▲ . . . . . SUMP/SPRING LOCATION
- ● . . . . . MONITORING WELL
- ■ . . . EAST END VOC PLUME

0 600 1200 2400

SCALE: 1" = 1200'



GEOLOGIC CROSS SECTION



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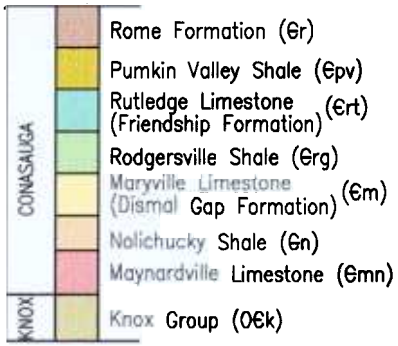


BUILDINGS

CREEK & TRIBUTARIES

PRIMARY & SECONDARY ROADS

GEOLOGIC CONTACT

Y-12 PLANT GRID

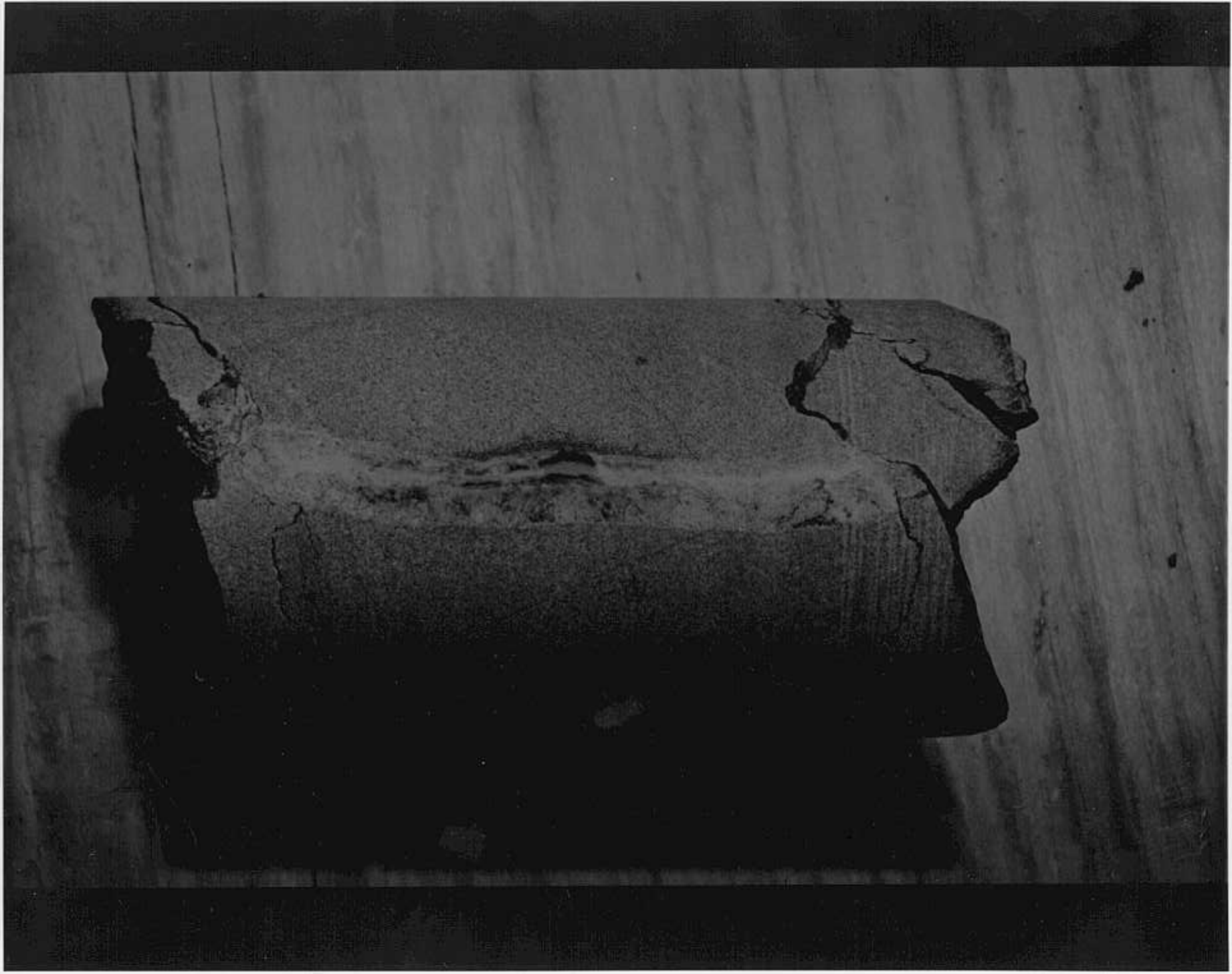
SOURCE: SUTTON AND FIELD (1995)

SCALE: 1" = 1200'

SAIC
Science Applications International Corporation

UEFPC CA RI REPORT
OAK RIDGE, TENNESSEE

REV. A / 01-13-98 / FILE NO.: 97009\DWGS\839OVH_2



Environment Safety and Health

Ed Moore, Y-12 Project (BJC) ES&H

Telephone Number.....241-3640
Pager Number.....417-5268

The Department of Energy (DOE) has very high expectations for safety performance on their Projects and at their facilities.

I. Integrated Safety Management System (ISMS)

- Five Core Functions

A. Scope of Work
B. Analyze Hazards
C. Implement Controls
D. Perform Work Safely
E. Feed back and Improvement

II. Zero Accident Performance

Goal for this project "No Injuries"

Plan Safety (ES&H) into the work

Safety must be your number one priority. The successful subcontractor shall demonstrate consistent safety performance for the duration of the project.

III. Site Visit

1. Radiation Protection

A. Y-12 Areas posted as "Radiation Control Area",

B. No contact with Rad Material is anticipated,

C. No entry into Rad Areas is anticipated

2. Mercury- No physical contact with Mercury is anticipated during this Site tour

3. Other hazards

A. Slips trips and falls
B. Weather
C. Local Wildlife
D. Traffic

IV. PPE- Minimum PPE for tour of site

A. Hard Hat
B. Safety Glasses
C. Sturdy Shoes

V. Emergency Protocol

PSS to be contacted in the event of injury and or accident while at the Y-12 Site (574-7172).

VI. Security and Badging

Turn your badge in at the end of the tour

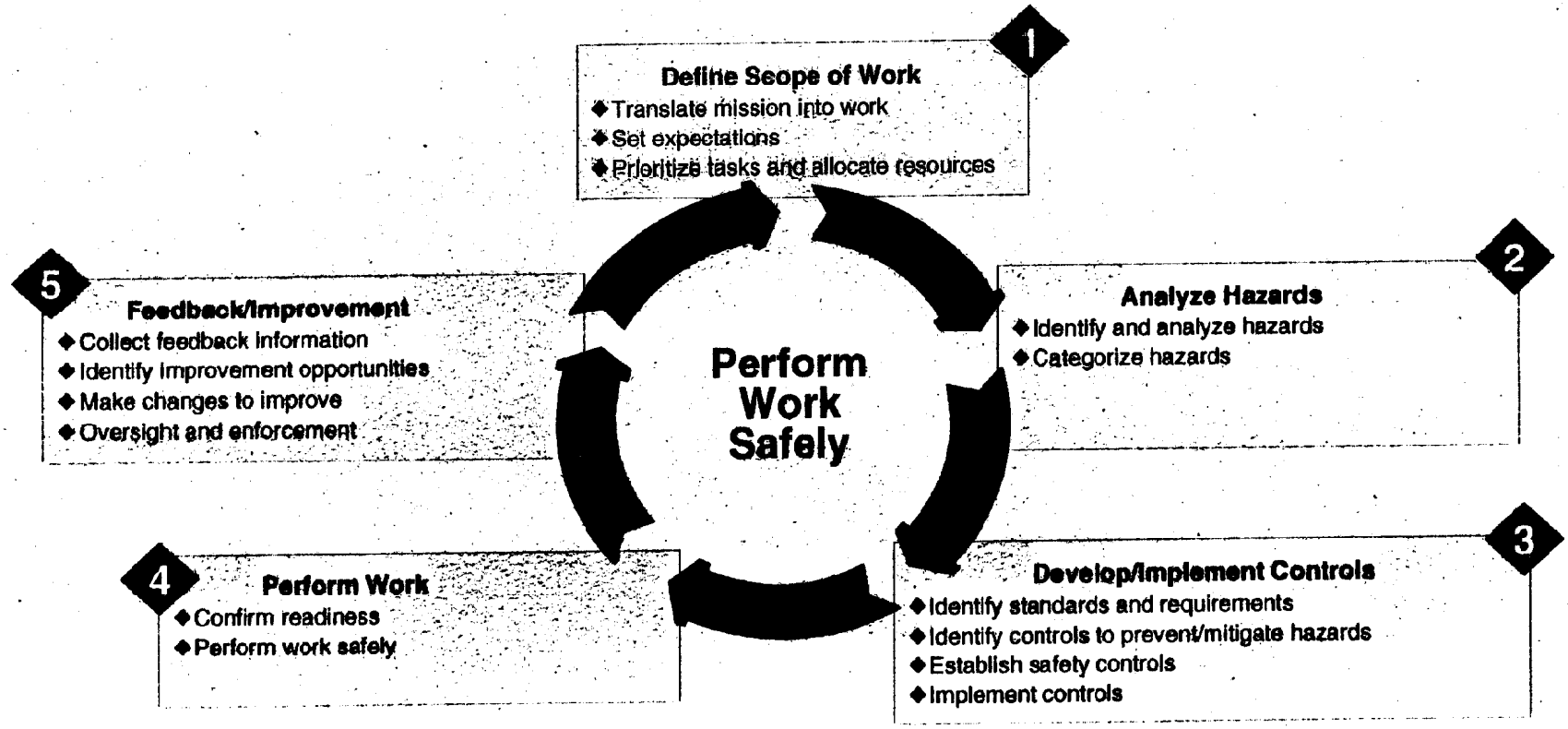
Zero Accident Performance Philosophy

Bechtel Jacobs Company is dedicated to the concept that all accidents are preventable. Accordingly, the company is committed to achieving and sustaining "*Zero Accident Performance*" through continuous improvement practices.

Guiding Principles of Integrated Safety Management

- Line management responsibility for safety
- Clear roles and responsibilities
- Competence commensurate with responsibilities
- Balanced priorities
- Identification of safety standards and requirements
- Hazard controls tailored to work being performed
- Operations authorization

Core Functions of Integrated Safety Management



ISMS

- STOP Work Authority- All employees(BJC & Subcontractor) have stop work authority when:
  - Hazards have not been addressed in AHA.
  - Imminent danger conditions exist site.
  - Changing Conditions exist

How many DOE, Bechtel Jacobs and Subcontractor employees does it take...

...to achieve ISM implementation and ES&H excellence?

The Single Most Important Element of ES&H Excellence is...

Demonstrated Management Commitment!

Demonstrated Management Commitment

must reflect a strong, genuine, continuous, and personal commitment to ES&H excellence

Integrated Safety Management Objective

DO WORK SAFELY